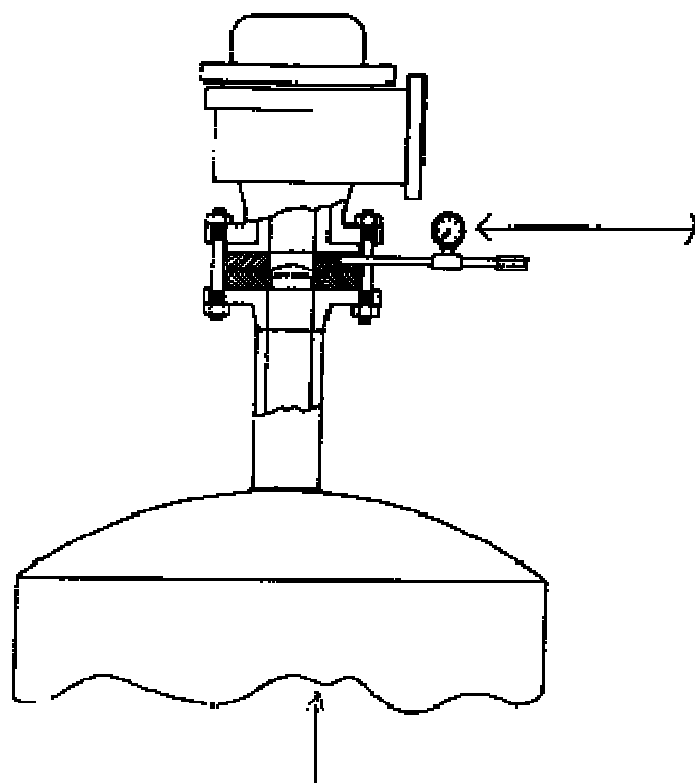
	<p style="text-align: center;">Dome Petroleum</p> <p style="text-align: center;">Installation of Rupture Disks to Prevent Volatile Organic Compounds (VOC) Air Emissions</p>
Standard Industrial Classification (SIC)	Hydrocarbon Gas Processing - 2911
Type of Waste	Very light end hydrocarbon liquids and gases
Strategy	Process Modification
Company Background	<p>Dome Petroleum Company was established in Superior in 1970. Dome is a subsidiary of Amoco Canada. The company employs four full-time employees and three contract employees. The facility stores natural gas liquids in some of the largest storage spheres in the world. In 1991, the facility was expanded with new storage tanks and a depropanizer facility. This facility separates propane from the butane in the natural gas liquids. The propane that is separated is sold locally.</p>
Original Process	<p>The original process had the process fluid pressure exerted directly on the face, body and gaskets of the pressure relief valve. Prior to installing the rupture disks the only way to minimize leaks was to do expensive monitoring on a quarterly basis. This monitoring only minimized leaks, it did not eliminate them.</p>
Motivation	<p>The motivation for installing the rupture disk was threefold:</p> <ul style="list-style-type: none"> • Environmental: Relief valves could have leaks that easily go undetected till the quarterly audit of the valves. • Safety: Combustion monitors located on the property may not detect a leak and puts the community and employees at risk. • Economics: Both lost product and the cost of the quarterly monitoring are saved by installing the rupture disks.
Pollution Prevention Process	<p>Dome Petroleum installed rupture disks between the process fluid and the pressure safety relief valves. The rupture disks are a non-mechanical over pressure relief device that totally isolates the process fluid from the safety relief valve. This isolation of the process fluids from the safety relief valves totally eliminates any gas leaks through the relief valves while at the same time maintains the safety of the processes emergency venting system. The space between the rupture disks and the pressure relief valve is monitored in the unlikely case of a leaking rupture disk. Monitoring in this space is accomplished with either a pressure alarm or pressure gauge. The pressure alarms that are now installed between the rupture disk and the pressure relief valves immediately inform the operators if there is a leak of process fluid. (<i>See diagram below.</i>)</p>
Scale of Operation	<p>Dome Petroleum has a storage capacity of 10.5 million gallons of natural gas liquids. The company processes 420,000 gallons of natural gas liquid daily to make propane.</p>
Stage of Development	This pollution prevention technique is in full use. Site inspection by air

	management staff verified this equipment installation in October 1995.																						
Level of Commercialization	These techniques have been available for many years but have been continually improved. The rupture disks are available for most hydrocarbon processes for a variety of size lines, working pressures and temperatures.																						
Material/Energy Balance	<p>Dome has virtually eliminated VOC air emissions from these valves. Using emission factors from the EPA, the calculation for the amount of product lost prior to installation of the rupture disks is:</p> <p>3 pipeline valves X 210.24 lbs of VOC/year = 630.27 lbs/yr 24 vessel relief valves X 3153.6 lbs of VOC/year = 75,686.4 lbs/yr</p> <p style="text-align: right;">Total = 76,317.12 lbs/yr VOCs (38TPY) or \$5,143.00/yr</p>																						
Economics	<p>Capital Costs</p> <table><tr><td>Rupture disks</td><td>\$11,551</td></tr><tr><td>Other mechanical material</td><td>5,785</td></tr><tr><td>Conduit and wiring</td><td>8,560</td></tr><tr><td>Tubing and isolation valves</td><td>4,600</td></tr><tr><td>Pressure switches</td><td>4,200</td></tr><tr><td>Crane rental</td><td>7,986</td></tr><tr><td>Labor</td><td>10,795</td></tr><tr><td>TOTAL</td><td>\$53,477</td></tr></table> <p>Operation/Maintenance Costs Previous to the installation of the rupture disks, operational costs were four site visits per year from the valve monitoring company. These monitoring tests cost \$16,000 per year (\$4,000 per visit). Under the terms of Dome Petroleum's permit with the DNR, monitoring has been reduced to one visit per year. Dome estimates that other operation and maintenance costs for the valves to be less than \$500 per year. Operation and maintenance costs are \$4,500 per year.</p> <p>Payback Period</p> <table><tr><td>Invested</td><td>Saved</td><td>Payback</td></tr><tr><td>\$53,477</td><td>\$16,643/yr.</td><td>3 years</td></tr></table>	Rupture disks	\$11,551	Other mechanical material	5,785	Conduit and wiring	8,560	Tubing and isolation valves	4,600	Pressure switches	4,200	Crane rental	7,986	Labor	10,795	TOTAL	\$53,477	Invested	Saved	Payback	\$53,477	\$16,643/yr.	3 years
Rupture disks	\$11,551																						
Other mechanical material	5,785																						
Conduit and wiring	8,560																						
Tubing and isolation valves	4,600																						
Pressure switches	4,200																						
Crane rental	7,986																						
Labor	10,795																						
TOTAL	\$53,477																						
Invested	Saved	Payback																					
\$53,477	\$16,643/yr.	3 years																					
Benefits	Lowered costs, higher level of environmental protection and improved protection from catastrophic failure of pressure safety relief valves.																						
Obstacles	None encountered. The DNR Air Management staff worked with Dome																						

	to achieve an additional economic benefit from this technology. Permit required monitoring was reduced while actual environmental protection was realized by lowered air emissions.
Technology Transfer	Any other hydrocarbon processor/storage facility can take advantage of these rupture disks to lower emissions and monitor expenses.
Other Pollution Prevention Activities	The older part of the plant (natural gas liquid storage) was not required to do valve monitoring. Dome included this part of the facility in the pollution prevention program along with the new part (the depropanizer processes).
Company Address	Dome Petroleum Corp. 21st and Stinson Ave. P.O. Box 2096 Superior, Wisconsin 54880
Contact Person	Richard Boyer, Area Foreman, (715) 398-3824
Pollution Prevention Resources	<p>Free, On-site Technical Assistance University of Wisconsin Extension Solid and Hazardous Waste Education Center Milwaukee area: 414/475-2845 Remainder of state: 608/262-0385</p> <p>Pollution Prevention Information Clearinghouse Wisconsin Department of Natural Resources Cooperative Environmental Assistance 608/267-9700 or e-mail: cea@dnr.state.wi.us</p>
<div> </div> <div> <p>Bureau of Cooperative Environmental Assistance Wisconsin Department of Natural Resources P.O. Box 7921 Madison, WI 53707 608/267-9700</p> </div> <div> <p>TS-066 96</p> </div>	

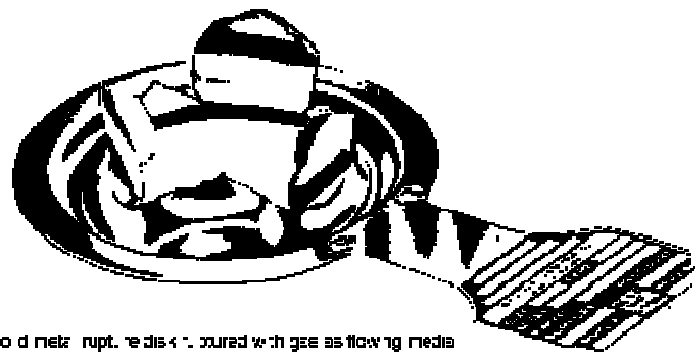


Pressure alarm is usually installed instead of gauge

Rupture disk installed in series with relief valve.



Solid metal rupture disk, before rupture.



Solid metal rupture disk covered with gas as flowing media